Moon (at First Quarter at 11h.) rises, 10h. 37m.; souths, 18h. 19m.; sets, 2h. 8m.*; decl. on meridian, 17° 8′ N.

Planet	Rises h. m.		Souths h. m.		Sets h. m.		Decl. on Meridian ° ′
Mercury	... 6 44	...	11 18	...	15 52	...	17 4 S.
Venus	... 6 30	...	11 5	...	15 40	...	16 54 S.
Mars	... 7 3	...	12 6	...	17 9	...	11 52 S.
Jupiter	... 16 56*	...	0 4	...	7 12	...	12 28 N.
Saturn	... 10 50	...	18 54	...	2 28*	...	21 36 N.

* Indicates that the rising is that of the preceding, and the setting that of the following nominal day.

Occultations of Stars by the Moon

Feb.	Star	Mag.	Disap. h. m.	Reap. h. m.	Corresponding angles from vertex to right for inverted image ° °
22	Aldebaran	1	17 17	17 50	20 336
23	130 Tauri	6	23 3	0 2†	145 288
26	B.A.C. 2872	6	15 59	16 24	340 286
27	α Cancri	4	4 1	4 53	104 303
28	B.A.C. 3407	6	5 24	5 37	187 216
28	π Leonis	5	6 5	6 45	147 253
28	35 Sextantis	6	23 59	1 4†	38 287

† Occurs on the following day.

It may be mentioned that times of disappearance and reappearance for the occultation of Aldebaran for various other positions in the United Kingdom will be found in NATURE, vol. xxxi. p. 322.

Phenomena of Jupiter's Satellites

Feb.	h. m.	
23	22 49	III. occ. disap.
24	2 49	III. ecl. reap.
	5 24	I. tr. ing.
25	2 32	I. occ. disap.
	4 57	I. ecl. reap.
	23 50	I. tr. ing.
26	2 9	I. tr. egr.
	20 58	I. occ. disap.
	23 26	I. ecl. reap.
27	1 51	II. tr. ing.
	4 47	II. tr. egr.
	18 16	I. tr. ing.
	20 35	I. tr. egr.
	21 38	IV. tr. ing.
28	2 11	IV. tr. egr.
	17 54	I. ecl. reap.
	20 48	II. occ. disap.

The Occultations of Stars and Phenomena of Jupiter's Satellites are such as are visible at Greenwich.

Feb.	h.	
23	8	Saturn in conjunction with and 3° 44′ north of the Moon.
28	12	Jupiter in conjunction with and 4° 27′ north of the Moon.
28	18	Mars at least distance from the Sun.

GEOGRAPHICAL NOTES

GEN. GORDON, when Governor of the Soudan in 1874, sent home to a friend a map of the route between Suakim, Berber, and Khartoum, drawn by himself. Mr. Stanford has reproduced this map in facsimile by permission, and it will probably be of great interest at the present juncture.

MR. STANFORD has recently issued two maps of the Soudan, in connection with the military operations which are at present being carried on in that region. These maps are most excellent, and must prove highly serviceable to all who wish to follow the course of events.

A VOLUME on New Guinea, which should be of great interest, is about to appear in Holland. The former Dutch Resident at Ternate, Mr. van Braam-Morris, in the course of his official tours on the Amberno or Rochussen rivers, succeeded in going a considerable distance to the south. His report, with the accompanying map, is now being prepared for publication by Mr. Robidée van der Aa, who is himself a high authority on New Guinea.

MR. A. M. SKINNER, Vice-President of the Straits branch of the Royal Asiatic Society, has published at Singapore, a Geography of the Malay Peninsula and the surrounding countries, in three parts, containing almost all that is known regarding the physical and political geography of these regions. The idea of the work was suggested by the Council of the Royal Colonial Institute, applying to the various Colonial Governments for school-books which might be used in schools at home for the instruction of pupils in the position, resources, and general progress of the Colonies.

IT is announced that Mr. Stanley's new work on "The Congo" will be published by Messrs. Sampson Low and Co. in April next.

UNDER the title of *O Explorador* (the Explorer) a Portuguese journal commenced its appearance with the new year at Lisbon. It will appear twice a month, and will chronicle the advance of science in all its branches, but especially that of geography and travel.

AT the meeting of the Geographical Society of Paris on the 6th inst. a letter was read from the French consul at Zanzibar describing recent events of geographical interest in Eastern Africa. Lieut. Gouin, Resident of France at Nam-Dinh, in the delta of the Red River, gave some information on the navigation and commercial resources of the southern mouths of the Red River. The most southern of all, the Cua-Day, is said to be navigable for sea-going junks, and to give immediate access to the richest rice-producing provinces of the delta. M. Léon Rousset read an account of a journey of eight months in Turkey. He dealt chiefly with the junction of the Turkish with the European railways.

ON A MODIFICATION OF FOUCAULT'S AND AHRENS'S POLARISING PRISMS

IN tracing by the usual methods the course of rays through one of the polarising prisms recently devised and constructed by Mr. C. D. Ahrens (described in the *Journal* of the Royal Microscopical Society for September 1884, and in the *Philosophical Magazine* for last month), I found that, in the case of a ray incident in a direction parallel to the axis of the prism, that component of it which passes through the middle spar-prism as the ordinary ray falls on the second surface of that prism at an angle of 42° 35′.

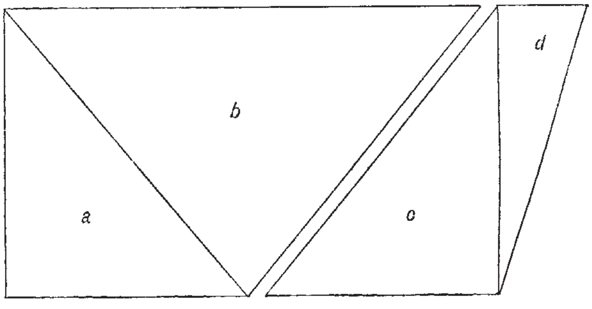
This is greater than the critical angle (37° 12′) for ordinary rays passing from calc-spar into air. Hence, if a film of air (as in Foucault's prism), instead of a film of Canada balsam (as in Ahrens's prism), is placed between this spar-prism and the next, the ordinary ray will be totally reflected, while the extraordinary component will still emerge and be available as a plane-polarised ray for experiments, as in Foucault's prism.

This extraordinary ray, however, is not only deviated on emergence, but also over-corrected for colour; the deviation from the direction of the original incident ray being—

For Fraunhofer's line	F	12° 20′
,, ,,	C	12° 35′

(as determined by using the light of a hydrogen vacuum-tube).

Both the deviation and the dispersion can be almost entirely corrected by passing the ray through a prism of crown glass combined with a prism of very dense flint glass, as shown in the drawing given below.



a, calc-spar; *b*, calc-spar; *c*, crown glass; *d*, dense flint glass.

What is said above respecting the ray incident parallel to the prism-axis applies to all rays incident at angles not greater than 14° with the axis; and thus the combination forms a polarising prism with an angular field of 28°, about equal to that of an ordinary Nicol's prism, and far greater than that of a Foucault's prism (which is only 8°).

The following points, among others, appear noteworthy in the above prism:—

(1) Its length is scarcely more than twice its breadth, the proportion between the two dimensions being rather greater than in

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Foucault's prism, about the same as in Ahrens's prism, and much less than in Nicol's prism.

(2) Only half the prism is made of Iceland spar, a material which is becoming deplorably scarce and expensive (I question if there is in England or elsewhere a piece of spar fit to make a Nicol's prism of 5 cm. aperture). The saving, however, is not so great as it appears, since the spar-prisms *a* and *b* are constructed on Wollaston's principle, and involve a certain waste of material.

(3) The combination is not quite free from distortion and chromatic aberration (the latter being due, of course, to irrationality of dispersion ; it is practically impossible to achromatise spar with glass), but the imperfection is not serious enough to interfere with its use for many optical purposes, especially as a polariser.

(4) In using it, a diaphragm should be placed in such a position as to limit the entering cone of rays to 28°, since at a greater angle (at any rate, on one side of the field) the ordinary rays are not separated by total reflexion.

Doubtless the prism may be improved upon by better authorities than myself; but I think that the principle of using a "double-image" prism to increase the divergence of the ordinary and extraordinary rays before one of them is separated by total reflexion is worth attention.

Ahrens's polarising prism is certainly a remarkable one. I do not think that a double-image prism has ever been previously constructed in which the extraordinary ray emerges without deviation, while the other ray is deviated to the extent of very nearly 60°.

H. G. MADAN

Eton College, February 17

THE RESULTS OF THE SCIENTIFIC EXPEDITION TO SODANKYLÄ

THE Government of Finland having provided further funds, the Expedition has continued its researches at Sodankylä, in Finnish Lapland, during the year 1883-84 (NATURE, vol. xxvii. pp. 322 and 389). The plan of working this year was chiefly confined to the study of the terrestrial galvanic currents, atmospheric electric currents, and the phenomena of light produced by the apparatus constructed by me for the purpose. The number of daily meteorological and magnetic observations was restricted to three, viz. at 6 a.m., 2 and 10 o'clock p.m., Göttingen mean time, but on the 1st and 15th of each month observations were taken every five minutes, as in the previous year, and on the 8th and 22nd of each month, from 8.30 p.m. till 10.30 p.m., observations were taken every half minute.

The general meteorological and magnetic observations were continued without interruption until August 22, 1884. In the account of the observations on the luminous phenomena will be included a *résumé* of the general character of the weather of this year.

The Terrestrial Current.—From the middle of September 1882 the Expedition has observed the terrestrial currents, as well as the magnetic variations. For this purpose two circuits about 5 km. long were placed north-south and east-west. They were connected to platina plates 1 decimetre square, and buried about 1·3 m. below the surface of the ground. The southern and eastern plates were about 0·5 km. from the station. During this year the observations were confined chiefly to the variations of the terrestrial current, hence no attempt was made to separate the electromotive force of the terrestrial current from that which was developed by the contact of the plates with the earth.

In the autumn of 1883 it became necessary to place fresh wires in the circuits, and at the same time the position of the plates was changed, so that each one was now about 2·5 km. from the station. The old circuit lying east and west was, however, left undisturbed for some time for the purpose of making comparisons.

It was not until the middle of January that observations of the terrestrial currents were commenced at the auxiliary station at Kultala, 68° 29′·5 N. (see Fig. 1). Here the circuits for the terrestrial current were placed so that the one lying north-south, 2·9814 km. long, was 3° west, and the east-west circuit, 4·5663 km. long, lay 69° north-west. This arrangement was made to permit the plates of the east and west being placed in the River Ivalo, and those lying north-south, in two affluents of this river. At this station attempts were made to eliminate that portion of the electromotive force which arose from the contact of the plates with "earth" (here the water) as well as the polarisation. The method employed was as follows:—With a Mascart electrometer, the sensitiveness of which had been exactly measured by a "Daniell" normal element (about 18 divisions of the scale per volt), the electromotive force of all the four plates in the earth was determined. These were then joined in six different ways with a galvanometer, and the deviations noted. A Daniell normal element, furnished with an adjustable resistance-slide, was then placed in the circuit in a contrary direction to the current, and the electromotive force was then reduced till the deviation was = 0. Thus the electromotive force of the different plates was obtained free of polarisation by means of an electrometer.

To eliminate the electromotive force arising from the contact of the plates with the water, the latter were taken to the station and sunk in the river close by. They were connected with a wire from the circuits resting on Mascart insulators. Their electromotive force was examined by means of an electrometer, which was discharged each time by a plate of zinc amalgam sunk in the river. This experiment was also made in another manner. All the plates were sunk in a bucket of water resting on Mascart insulators and connected with the earth by a copper wire. The two latter experiments gave very similar results. When the platina plates had been examined in this manner, they were placed in their former positions, after which they were again examined both by the galvanometer and electrometer. The details of this experiment, as well as those of others, must, however, be reserved for a special memoir. By the above-mentioned means results are shown free from any accidental disturbing influences. Some observations, though as

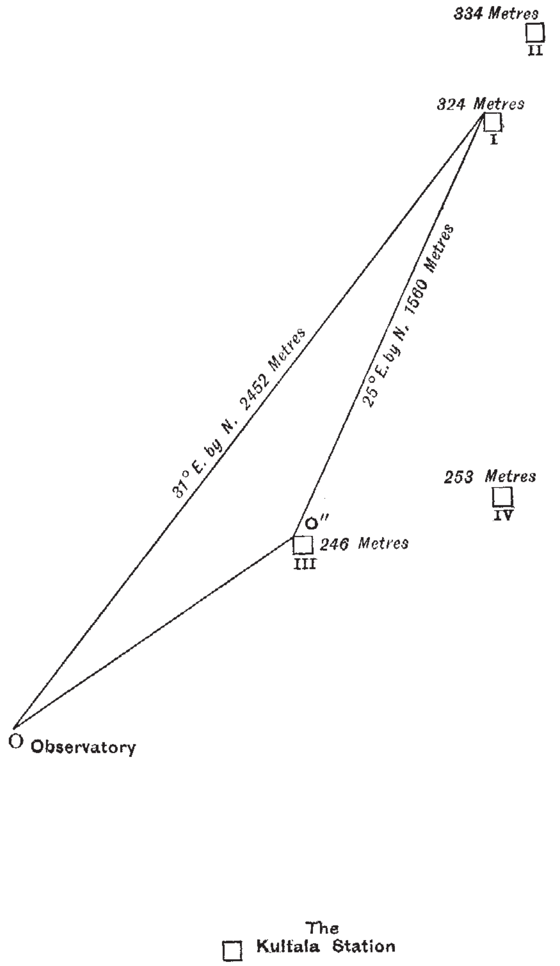

FIG. 1.—Plan of the position of the apparatus on the Pietarintunturi Mountains.

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